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**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION**

**THE TRUSTEES OF PURDUE
UNIVERSITY,**

Plaintiff,

vs.

**STMICROELECTRONICS
INTERNATIONAL N.V. and
STMICROELECTRONICS, INC.,**

Defendants.

Civil Action No. 6:21-CV-00727-ADA-DTG

JURY TRIAL DEMAND

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**DEFENDANTS' OPPOSED MSJ NO. 4: MOTION FOR PARTIAL SUMMARY
JUDGMENT THAT CLAIM 10 IS INDEFINITE**

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Defendants move for partial summary judgment that asserted claim 10 of the '633 patent is indefinite. Claim 10 was added to the case *after* claim construction, so Defendants did not have the opportunity to raise indefiniteness during that process. Claim 9 was at issue during claim construction and Defendants challenged as indefinite the following term therein (emphasized portion was the specific challenged term): “the JFET region having a width of *less than about three micrometers*.” The Court did not accept that position, and found the term had its plain and ordinary meaning. Claim 10 depends from claim 9 and includes the limitation “wherein the JFET region has a width of *about one micrometer*.” Although “about one micrometer” is indefinite for many of the same reasons as is the similar term in claim 9, when claims 9 and 10 are considered together, the problem with the phrase is inescapable and claim 10 thus raises new issues for consideration. Accordingly, the use of “about” in claim 10 in the context of its dependence from claim 9 justifies finding it indefinite even if the Court maintains its position claim 9 is definite.

The parties conferred regarding this motion and it is opposed because Plaintiff does not agree to the relief requested.

I. STATEMENT OF UNDISPUTED MATERIAL FACTS

1. Plaintiff The Trustees of Purdue University (“Plaintiff”) asserts claims 9 and 10 of U.S. Patent No. 7,498,633 (the “’633 patent”). Ex. 1, ’633 patent at cls. 9–10.

2. Claims 9 and 10 read:

9. A double-implanted metal-oxide semiconductor field-effect transistor comprising:

a silicon-carbide substrate;

a drift semiconductor layer formed on a front side of the semiconductor substrate;

a first source region;

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a first source electrode formed over the first source region, the first source electrode defining a longitudinal axis;

a plurality of first base contact regions defined in the first source region, each of the plurality of first base contact regions being spaced apart from each other in a direction parallel to the longitudinal axis defined by the first source electrode;

a second source region;

a second source electrode formed over the second source region. the second source electrode defining a longitudinal axis;

a plurality of second base contact regions defined in the second source region, each of the plurality of second base contact regions being spaced apart from each other in a direction parallel to the longitudinal axis defined by the second source electrode; and

a JFET region defined between the first source region and the second source region, *the JFET region having a width less than about three micrometers.*

10. The double-implanted metal-oxide semiconductor field-effect transistor of claim 9, wherein *the JFET region has a width of about one micrometer.*

Id. (emphasis added).

3. The specification of the '633 patent does not disclose what is the purpose of the “less than about three micrometers” limit on JFET width in the claimed invention of claim 9 or the “about one micrometer” limitation of claim 10. *See generally id.*

4. There are factors such as process bias, types of equipment and other manufacturing capabilities that affect the precision with which features can be formed in real semiconductor devices. Those factors affect what are referred to as manufacturing tolerances. The specification of the '633 patent does not include any disclosure regarding semiconductor manufacturing tolerances as of the time of the claimed invention. *See generally id.*

5. Manufacturing tolerances are not a fixed percentage of the size of the feature being constructed; rather, they are typically described either in absolute terms or are referenced to the smallest dimension feature (*e.g.*, line width) that can be reliably fabricated with the given set of equipment and/or manufacturing process. In that context, a POSITA would expect some

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variation from such a minimum dimension feature and the same variation even for larger features. The amount of variation would not simply scale up or down when larger or smaller features are fabricated, *i.e.*, as a percentage (e.g., +/- 10%) of the overall feature being fabricated (such as JFET width). Ex. 2, Neikirk Depo. Tr. at 93:2-20.

6. The '633 patent does not include any disclosure regarding particular equipment or processes to be used for fabricating the claimed devices or the inherent manufacturing tolerances associated with the particular equipment or processes to be used. *See generally id.*

7. During claim construction, only claim 9 was asserted and ST argued “less than about three micrometers” from that claim was indefinite, based on the facts set forth above. Dkt. 66 at 16-20; Dkt. 74 at 6-8. The Court rejected those arguments, Dkt. 220 at 29-31, and ST filed objections thereto, Dkt. 229 at 2-6. The Court has not yet ruled on those objections.

II. LEGAL STANDARDS

A. Summary Judgment Standard.

Rule 56(a) of the Federal Rules of Civil Procedure provides that summary judgment shall be granted “if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law.” FED. R. CIV. P. 56(a). Partial summary judgment may be granted on discrete issues, including indefiniteness. *Cf. e.g., Versata Software, Inc. v. Zoho Corp.*, 213 F. Supp. 3d 829, 834 (W.D. Tex. 2016). Indeed, this Court typically rules on indefiniteness during claim construction because indefiniteness is an issue for the Court as a matter of law. *ePlus, Inc. v. Lawson Software, Inc.*, 700 F.3d 509, 517 (Fed. Cir. 2012).

B. Indefiniteness Standards.

Patent claims must particularly point out and distinctly claim the subject matter regarded as the invention. 35 U.S.C. § 112(b). Viewed in light of the intrinsic evidence, a claim must “inform those skilled in the art about the scope of the invention with reasonable certainty.”

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Nautilus Inc. v. Biosig Instruments, Inc., 572 U.S. 898, 910 (2014). If not, it is indefinite. *Id.*

When “about” is used as part of a numeric range, “[its] meaning depends on the technological facts of the particular case.” *Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1368 (Fed. Cir. 2008) (alteration in original) (quoting *Pall Corp. v. Micron Separations, Inc.*, 66 F.3d 1211, 1217 (Fed. Cir. 1995)). The criticality of the numerical limitation to the context of the invention determines how far beyond the claimed range the term “about” extends the claim. *Id.* (citing *Ortho–McNeil Pharm., Inc. v. Caraco Pharm. Labs., Ltd.*, 476 F.3d 1321, 1327 (Fed. Cir. 2007)). “In other words, we must look to the purpose that the “about [a certain dimension]” limitation serves, to determine how much smaller than [that dimension] the [feature] can be and still serve that purpose. To be clear, it is the purpose of the limitation in the claimed invention—not the purpose of the invention itself—that is relevant.” *Id.* If that cannot be determined based upon the disclosure in the specification and knowledge of a POSITA, the term is indefinite. *Id.*

III. ARGUMENT

As the cases above illustrate, the Court must look to the purpose the “about one micrometer” limitation serves to determine with any reasonable certainty how much greater (or less) than 1 micrometer the JFET width can be and still serve that purpose. But neither the intrinsic nor extrinsic record explains the JFET width’s purpose.

For example, the ’633 patent’s specification does not say there is any particular characteristic or purpose of the device that is achieved with a JFET width in the vicinity of about 1 micrometer that is not achievable at other dimensions—whether 0.9 micrometers, 1.1 micrometers, 1.3 micrometers, or any other dimension. To the contrary, claim 10 depends from claim 9 which requires a JFET width three times larger, and the specification does not disclose any result or purpose that is achieved by “about one micrometer” that is different than “less than about three micrometers.” The specification explains that there are multiple design

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characteristics that a designer may consider: “One design consideration . . . is the blocking voltage of the semiconductor device. [F]or high-voltage power applications, a high blocking voltage is generally desirable. Another design consideration . . . is the specific on-resistance.” Ex. 1, at 1:18–28. Moreover, the specification explains that MOSFET design involves many design parameters (including the width of the JFET region) that are interdependent, where design choices for one parameter invariably affect the other parameters. *Id.* at 6:55–62. Although the patent says a short JFET width “may reduce the specific on-resistance,” *id.* at 6:23–24, and “may tend to increase the blocking voltage,” *id.* at 6:47, neither the desired on-resistance nor desired blocking voltage are specified by the claims or specification. Instead, the patent discloses that these design parameters are subjective choices of the designer. *Id.* at 6:53–57. As a result, there is no basis in the specification from which to determine the criticality of the “about one micrometer” JFET width, the precision required, or the range of values encompassed.

For the “less than about three micrometers” term in claim 9, the Court relied on extrinsic evidence from Plaintiff’s Bhat expert declaration regarding semiconductor fabrication to fill the gaps in the specification – that is where the notion that “about” means +/- 10% variation originated. Dkt 76-1, ¶13. Defendants respectfully suggest that was improper. Nothing in the Bhat declaration, nor any other intrinsic or extrinsic evidence, provides any explanation for what a POSITA would understand as to the tolerances of semiconductor fabrication processes in 2004–2006 for a JFET width. The Bhat declaration cited a textbook from 2000 for the purported proposition that +/- 10% variation applies across different size features. Dkt 76-1, ¶13 (arguing that “a $\pm 10\%$ variation is the expected value for tolerances in the lithography and etching in a typical manufacturing facility.”). However, the textbook passages cited by Bhat do not support

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his proposition.¹ To the contrary, the book describes a percentage variation based on the “minimum linewidth” in a given process – the smallest dimension that can be reliably produced. Dkt. 76-2 at p. 6 of 7 (“For example, the required tolerance on *a nominal 1-μm linewidth of polysilicon features* is typically $\pm 10\%$, or $\pm 0.1 \mu\text{m}$ ” and “For example, in a process that has *minimum linewidths* of $0.35 \mu\text{m}$, and spaces of $0.35 \mu\text{m}$, the *controllability specification might be a maximum 10% linewidth variation.*”) (emphasis added).

Application of Bhat’s $\pm 10\%$ to *both* the “about three” and the “about one” limitations leads to absurd results that illustrate the inappropriateness of Plaintiff’s manufacturing tolerances gap-filling approach. Application of Bhat’s $\pm 10\%$ results in “about” varying ± 0.3 micrometers for “less than about three,” while it only varies ± 0.1 micrometers for “about one.” That is triple the variance for the two terms based on the same word “about.” That cannot be right. In truth, the very textbook Bhat relies on for his rule shows that manufacturing tolerances do not depend on the size of the feature being constructed. They may be expressed relative to smallest dimension feature (*e.g.*, line width) that can be reliably fabricated with a given set of equipment, processes and materials, or simply as an amount. Thus, for a given fabrication set up, the tolerance would be the same amount regardless of the width of the JFET—either ± 0.1 or ± 0.3 or ± 0.05 , etc. *for both* “about 3” and “about 1.” The amount of variation would not simply scale up or down when larger or smaller features are fabricated, *i.e.*, as a percentage (*e.g.*, $\pm 10\%$) of the overall feature being fabricated (such as JFET width). SOF, ¶5.

Further, if “about” refers to manufacturing variation, a POSITA would need to know the equipment and processes used to understand the tolerances for it. It only stands to reason there

¹ Expert opinion contradicted by the documents alleged to support it should be disregarded. *See Homeland Housewares, LLC v. Whirlpool Corp.*, 865 F.3d 1372, 1378 (Fed. Cir. 2017) (“[W]e must disregard the testimony of an expert that is plainly inconsistent with the record....”).

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were many different processes and equipment available at the time of the invention, and thus there is no evidence that a POSITA would know, with reasonable certainty, the range for “about one micrometer.” The text cited by Bhat confirms this. Dkt. 76-2 at p. 6 of 7 (“Linewidth control is impacted by a variety of factors, depending on hardware, processes, and materials.”).

Ultimately, and perhaps most importantly, there is nothing in the intrinsic evidence that even suggests that “about” in claim 10 is intended to address manufacturing tolerances in the first place. To the contrary, the only discussion of JFET width is its potential to effect on-resistance and/or blocking voltage. Ex. 1 at 6:47; 6:53–57. And the only disclosure of manufacturing tolerances is how misalignment might be addressed by forming the base contact regions as “islands.” *Id.* at 7:52–59. It is thus improper to interpret “about” in view of manufacturing tolerances. *See Ortho-McNeil Pharm., Inc. v. Kali Labs., Inc.*, 482 F.Supp.2d 478, 496 (D.N.J. 2007) (“Measurement error is not mentioned in any manner in the specification. ... If the occurrence of measurement errors were important enough, or common enough, that the inventors felt the need to represent the variation created by such errors with the word “about” in the patent claims, one would think such errors would be accounted for in the specification's description of how the drug is prepared and measured for administration.”), *overruled on other grounds*, 344 F.App’x. 595 (Fed. Cir. Aug. 26, 2009).

The specification and claims of the ‘633 patent also do not inform a POSITA where or how the width of the JFET region should be measured relative to the boundary of the p wells or source regions. In one location, the specification purports to identify a width of the JFET region “in some embodiments” as item 36 in Figure 1. Ex. 1 at 6:16-27. But this is not stated as a definition nor does it address that the edges of the p-wells are curved and the width is therefore not uniform. Likewise, it does not address that patent figures are understood as not being drawn

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to scale. Further, Figure 1 identifies the JFET region as area 30, which clearly includes lower portions that extend under the p wells such that the JFET region is wider in these areas. *See also id.* at 5:25-26. The ambiguity is compounded by differing definitions in the specification and claims. The asserted claims require a JFET “defined between the first source region and the second source region.” Like the p wells, the source regions are also shown in Figure 1 as having curved sides. As such, there are both different boundaries and different positions along the boundaries of the JFET region where width may be measured, and the patent does not specify what measurement is claimed. A given device may fall within or outside the scope of the claims depending on which location is chosen.

In sum, neither the claims nor the specification provide any guidance from which to determine the range encompassed by “about one micrometer,” particularly in view of the parent claim which requires “less than about three micrometers.” And a POSITA, understanding the design tradeoffs inherent in MOSFET devices, has no guidance regarding the criticality of the one micrometer measurement to the invention to reasonably determine the range. Given that, a POSITA is not provided with the context to understand how close the measurement can (or must) be to one micrometer to be acceptable, and whether such measurement would be based on the design (*i.e.*, desired width) or the actual manufactured width, while taking into account unknown manufacturing tolerances of the different fabrication processes available. Therefore, the term is indefinite, just as courts have held in similar cases. *Pac. Coast Bldg. Prod., Inc. v. CertainTeed Gypsum, Inc.*, 816 F.App’x 454, 458 (Fed. Cir. 2020) (“We have previously found claims indefinite where the claim requires a specific measurement or calculation, more than one measurement method may be used and no guidance has been provided.”).

Further confirmation of the indefiniteness of “about one micrometer” (and “less than

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about three micrometers”) can be gleaned from examining how Plaintiff’s position regarding their scope has continued to evolve—*i.e.*, shift—during and after claim construction. During claim construction, when trying to save “less than about three micrometers” from indefiniteness, Plaintiff initially described variation in absolute terms as ± 0.2 micrometers. Dkt 70-1, ¶33 (“The [critical dimension] variation is typically on the order of ± 0.2 micrometers.”). However, in its responsive brief, Plaintiff changed its position and, rather than relying on absolute dimensions, argued ‘about’ meant $\pm 10\%$. Dkt. 70 at 12 (“In this case, a POSITA would interpret ‘about’ as implying $\pm 10\%$ variation when referring to a numerical value.”).

While Plaintiff escaped an indefiniteness holding by arguing “about” means $\pm 10\%$, Plaintiff’s infringement expert does not so limit his allegations. In his infringement expert report, Plaintiff’s Dr. Cooper (also the lead named inventor) now says: “any measurement less than 3.3 *or so* microns would fall within the scope of the claims in my opinion, given the semiconductor manufacturing variances and equipment tolerances.” Ex. 3, Cooper Rpt, ¶70 (emphasis added). Plaintiff’s shifting-sands approach to the meaning of “about” confirms both claims 9 and 10 are indefinite.

IV. CONCLUSION

Defendants respectfully request that the Court grant partial summary judgment that claim 10 of the ’633 patent is indefinite.

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Respectfully submitted,

By: /s/ Michael D. Hatcher

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CERTIFICATE OF SERVICE

I, the undersigned, do hereby certify that a true and correct copy of the foregoing document was served on all parties to this action via electronic mail on August 8, 2023.

/s/ Michael D. Hatcher

Michael D. Hatcher